Docket No. 246019US2 CONT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF: Satoshi KOHTAKA et al. GAU:

SERIAL NO: New Application EXAMINER:

FILED: Herewith

FOR: LIQUID CRYSTAL DISPLAY DEVICE

REQUEST FOR PRIORITY

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

SIR:

■ Full benefit of the filing date of U.S. Application Serial Number 09/592,587, filed June 12, 2000, is claimed pursuant to the provisions of **35 U.S.C. §120**.

☐ Full benefit of the filing date(s) of U.S. Provisional Application(s) is claimed pursuant to the provisions of **35 U.S.C. §119(e)**: Application No. Date Filed

■ Applicants claim any right to priority from any earlier filed applications to which they may be entitled pursuant to the provisions of **35 U.S.C. §119**, as noted below.

In the matter of the above-identified application for patent, notice is hereby given that the applicants claim as priority:

COUNTRY	APPLICATION NUMBER	MONTH/DAY/YEAR
Japan	11-167872	June 15, 1999
Japan	11-266956	September 21, 1999

Certified copies of the corresponding Convention Application(s)

- ☐ are submitted herewith
- ☐ will be submitted prior to payment of the Final Fee
- ■ were filed in prior application Serial No. 09/592,587 filed June 12, 2000
- ☐ were submitted to the International Bureau in PCT Application Number
  Receipt of the certified copies by the International Bureau in a timely manner under PCT Rule 17.1(a) has been acknowledged as evidenced by the attached PCT/IB/304.
- ☐ (A) Application Serial No.(s) were filed in prior application Serial No. filed ; and
- ☐ (B) Application Serial No.(s)
  - ☐ are submitted herewith
  - ☐ will be submitted prior to payment of the Final Fee

Respectfully Submitted,

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VERIFICATION OF TRANSLATION

I, Mochikazu Hori, being a citizen of Japan, residing at c/o ASAHINA & CO., NS Bldg., No. 2-22, Tanimachi 2-chome, Chuo-ku, Osaka-shi, Osaka, 540-0012, Japan, do solemnly and sincerely declare as follows:

I am a translator, of ASAHINA & CO., of NS Bldg., No. 2-22, Tanimachi 2-chome, Chuo-ku, Osaka, 540-0012, Japan.

I am well acquainted with the English and Japanese languages.

The attached translation is a true and correct translation into the English language of a certified copy of Japanese Patent Application No. 167872/1999 filed on June 15, 1999.

I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

This 26th day of November, 2003

by Mochikazu Hori

Mochikazu Hori

PATENT OFFICE

JAPANESE GOVERNMENT

This is to certify that the annexed is a true copy of the following application as filed with this Office.

Date of Application: June 15, 1999

Application Number: 167872/1999

Applicant(s): ADVANCED DISPLAY INC.

March 10, 2000

Commissioner, Patent Office Takahiko Kondo

Appln. Certification No. Pat. 2000-3015614

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[To Whom]	Commissioner of Patent Office Yasushi Isayama
[International Patent Classification]	G02F 1/133
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[Document Name]

SPECIFICATION

[Title of the Invention]

LIQUID CRYSTAL DISPLAY DEVICE

[CLAIMS]

1. A liquid crystal display comprising:

a first insulating substrate;

display pixels formed in such a manner as to be arranged in array like shape on the first insulating substrate, said display pixels having pixel electrodes electrically connected to each other;

a counter substrate comprising common electrodes which are formed on a second insulating substrate;

a liquid crystal layer interposed between the first insulating substrate and the second insulating substrate, the first insulating substrate and the second insulating substrate being bonded each other;

a transfer electrode for supplying a common electrical potential to common electrodes on the second insulating substrate through a conductive material;

wherein the transfer electrode is formed by patterning a conductive thin film, wherein said conductive thin film has been formed by a process of forming a last metal film of the first insulating substrate;

wherein a first conductive metal film and the conductive thin film are connected to each other on a periphery of the transfer electrode through a contact hole or through a direct contact, and the conductive thin film is directly formed on the first insulating substrate at one

portion of the center portion of the opening of the transfer electrode, wherein said first conductive metal film has been formed by a process of forming a second conductive film of the first insulating substrate, and wherein said first conductive metal film is connected to the common electrode potential.

2. The liquid crystal display of Claim 1, wherein on a periphery of the transfer electrode, the first conductive metal film is located within the first insulating film that is formed after a process of forming the first conductive metal film and the second insulating film that is formed after a process of forming the second conductive metal film.

3. A liquid crystal display comprising:

a first insulating substrate;

display pixels formed in such a manner as to be arranged in array like shape on the first insulating substrate, said display pixels having pixel electrodes electrically connected to each other;

a counter substrate comprising common electrodes which are formed on a second insulating substrate

a liquid crystal layer interposed between the first insulating substrate and the second insulating substrate, the first insulating substrate and the second insulating substrate being bonded to each other;

a transfer electrode for supplying a common electrical potential to common electrodes on the second insulating substrate through a conductive material;

wherein said transfer electrode is formed by patterning a conductive thin film, wherein said conductive thin film has been formed by a process of forming a first conductive film of the first insulating substrate;

wherein a second conductive metal film and the conductive thin film are connected to each other on the periphery of the transfer electrode through a contact hole or through a direct contact, and the conductive thin film is directly formed on the first insulating substrate at one portion of a center portion of an opening of the transfer electrode, wherein said second conductive metal film has been formed film by a process of forming the first insulating substrate, and wherein said second conductive thin film is connected to the common electrode potential.

4. A liquid crystal display comprising:

a first insulating substrate;

display pixels formed in such a manner as to be arranged in array like shape on the first insulating substrate, said display pixels having pixel electrodes electrically connected to each other;

a second insulating substrate;

a counter substrate comprising common electrodes which are formed on the second insulating substrate;

a liquid crystal layer interposed between the first insulating substrate and the second insulating substrate, the first insulating substrate and the second insulating substrate being bonded to each other;

a transfer electrode for supplying a common electrical

potential to common electrodes on the second insulating substrate through a conductive material;

wherein said transfer electrode is formed by patterning a conductive thin film that has been formed by a process of forming a last conductive film of the first insulating substrate;

wherein a first conductive metal film, a second conductive metal film and the conductive thin film are connected to each other on a periphery of the transfer electrode through a contact hole or through a direct contact, and the conductive thin film is directly formed on the first insulating substrate at one portion of the center portion of an opening of the second transfer electrode.

[DETAILED DESCRIPTION OF THE INVENTION]

[Technical Field of the Invention]

The present invention relates to a liquid crystal display in which a pair of insulating substrates are bonded so as to interpose a liquid crystal layer between the pair of insulating substrates, and more particularly to a shape of inner connecting electrodes of counter electrodes.

[Prior Art]

In a liquid crystal display using an array substrate on which transfer electrodes are formed by patterning a conductive thin film that has been formed by the last step of forming a conductive film in a step of manufacturing an array substrate, the transfer electrode for supplying a common electrical potential to common electrodes on a counter substrate has a structure in which the film thickness of the laminated layers in the center portion of the transfer electrode is allowed to have

the same thickness as the peripheral portion thereof.

As illustrated in Fig. 4, in the structure of the conventional transfer electrode, in the case where an electrical potential is supplied from a transfer electrode 2 on an insulating substrate 1 to a common electrode (conductive thin film 11) on a counter substrate 10 through a conductive material 9 and the common electrode potential is supplied to the transfer electrode 2 through a conductive metal film 3 formed in the second step of forming a conductive film on the insulating substrate 1, the conductive metal film 3 which is electrically connected to a conductive thin film 6 formed in the last step of forming a conductive film of the insulating substrate 1 via a contact hole 7 on the periphery of the transfer electrode 2, and as shown in Fig. 4, the conductive metal film 3 is provided beneath the conductive thin film 6 in such a manner so as to reach substantially the center portion of opening of the transfer electrode. Accordingly, not only an insulating film 5 which is formed after the step of forming the conductive metal film formed in the first step of forming a conductive film on the insulating substrate 1, but also an insulating film 4 which is formed after the step of forming the conductive metal film 3, are respectively provided beneath the conductive thin film 6 of the transfer electrode; thus, the film thickness of the laminated layer in the center portion of the transfer electrode is allowed to have the same film thickness as the peripheral portion thereof.

The above-mentioned conventional arrangement has exemplified the case where a common electrode potential is supplied to the transfer electrode through the conductive metal film 3 formed in the second step of forming a conductive film on the insulating substrate 1.

Also in the case where the electrical potential is supplied to the transfer electrode through another conductive metal film, the conductive metal film and the insulating film are provided so as to reach substantially the center portion of the opening of the transfer electrode; therefore, the film thickness of the laminated layer in the center portion of the transfer electrode is allowed to have the same film thickness as the peripheral portion thereof.

[Problems to be Solved by the Invention]

However, in the above-mentioned construction where the film thickness of the laminated layer in the center portion of the transfer electrode is allowed to have the same film thickness as the peripheral portion thereof, in the case where, upon joining to the colour filter substrate, compressive deformation of a conductive material applied to the transfer electrode is insufficient, the cell gap in the vicinity of the transfer electrode tends to become thicker. As a result, a change in the panel transmittance locally occurs; this causes irregularity in luminance, resulting in degradation in the yield, and in the case when an attempt is made to confirm deformation under compression of the conductive material from the rear face side, since the gap portion of the metal film is small and since the insulating films are interpolated, it is difficult to make an appropriate confirmation.

The present invention has been made so as to solve the above-mentioned problems, and its objective is to make the cell gap in the vicinity of the transfer electrode uniform so that the local change in the panel transmittance is prevented, the uniformity of luminance is improved, and the yield is also improved. Moreover, the gap portion between the metal films is made greater and the insulating film is not

interpolated in the gap portion; thus, it is possible to easily confirm deformation under compression of the conductive material from the rear face side of the array substrate.

[Means to Solve the Problems]

A first first liquid crystal display of the present invention includes:

a first insulating substrate;

display pixels formed in such a manner as to be arranged in array like shape on the first insulating substrate, said display pixels having pixel electrodes electrically connected to each other;

a counter substrate comprising common electrodes which are formed on a second insulating substrate;

a liquid crystal layer interposed between the first insulating substrate and the second insulating substrate, the first insulating substrate and the second insulating substrate being bonded each other;

a transfer electrode for supplying a common electrical potential to common electrodes on the second insulating substrate through a conductive material;

wherein the transfer electrode is formed by patterning a conductive thin film, wherein said conductive thin film has been formed by a process of forming a last metal film of the first insulating substrate;

wherein a first conductive metal film and the conductive thin film are connected to each other on a periphery of the transfer electrode through a contact hole or through a direct contact, and the conductive thin film is directly formed on the first insulating substrate at one portion of the center portion of the opening of the transfer electrode, wherein said first conductive metal film has been formed by a process of

forming a second conductive film of the first insulating substrate, and wherein said first conductive metal film is connected to the common electrode potential

A second liquid crystal display of the present invention is the liquid crystal display, in which on a periphery of the transfer electrode, the first conductive metal film is located within the first insulating film that is formed after a process of forming the first conductive metal film and the second insulating film that is formed after a process of forming the second conductive metal film.

A third liquid crystal display of the present invention includes:

a first insulating substrate;

display pixels formed in such a manner as to be arranged in array like shape on the first insulating substrate, said display pixels having pixel electrodes electrically connected to each other;

a counter substrate comprising common electrodes which are formed on a second insulating substrate

a liquid crystal layer interposed between the first insulating substrate and the second insulating substrate, the first insulating substrate and the second insulating substrate being bonded to each other;

a transfer electrode for supplying a common electrical potential to common electrodes on the second insulating substrate through a conductive material;

wherein said transfer electrode is formed by patterning a conductive thin film, wherein said conductive thin film has been formed by a process of forming a first conductive film of the first insulating

substrate;

wherein a second conductive metal film and the conductive thin film are connected to each other on the periphery of the transfer electrode through a contact hole or through a direct contact, and the conductive thin film is directly formed on the first insulating substrate at one portion of a center portion of an opening of the transfer electrode, wherein said second conductive metal film has been formed film by a process of forming the first insulating substrate, and wherein said second conductive thin film is connected to the common electrode potential.

A fourth liquid crystal display of the present invention includes:

a first insulating substrate;

display pixels formed in such a manner as to be arranged in array like shape on the first insulating substrate, said display pixels having pixel electrodes electrically connected to each other;

a second insulating substrate;

a counter substrate comprising common electrodes which are formed on the second insulating substrate;

a liquid crystal layer interposed between the first insulating substrate and the second insulating substrate, the first insulating substrate and the second insulating substrate being bonded to each other;

a transfer electrode for supplying a common electrical potential to common electrodes on the second insulating substrate through a conductive material;

wherein said transfer electrode is formed by patterning a

conductive thin film that has been formed by a process of forming a last conductive film of the first insulating substrate;

wherein a first conductive metal film, a second conductive metal film and the conductive thin film are connected to each other on a periphery of the transfer electrode through a contact hole or through a direct contact, and the conductive thin film is directly formed on the first insulating substrate at one portion of the center portion of an opening of the second transfer electrode.

[Embodiment for carrying out the Invention]

[EMBODIMENT 1]

Referring to Fig. 1, the following description will discuss the EMBODIMENT 1 of the present invention. Fig. 1 shows a cross sectional view of a transfer electrode in the EMBODIMENT 1 of the present invention, and the following description will discuss the construction together with the functions thereof. Here, the construction in which an electrical potential is connected to the common electrodes (conductive thin film) on the opposing substrate side from the transfer electrode on the insulating substrate 1 through the conductive material is the same as that shown in Fig. 4; therefore, the description thereof is omitted. Fig. 1 shows a cross-sectional shape of the transfer electrode on an array substrate side of a liquid crystal display constituted by a pair of insulating substrates that are joined to each other with a liquid crystal layer interpolated in between; and reference number 1 is an insulating substrate (glass substrate), 2 is a transfer electrode, 3 is a conductive metal film that has been formed in the second conductive film forming process of the insulating

substrate 1, 4 is an insulating film formed after the conductive metal film 3, 5 is an insulating film formed after the conductive metal film formed in the first conductive film forming process of the insulating substrate 1, 6 is a conductive thin film that is formed in the last conductive film forming process of the insulating substrate 1 and that forms the transfer electrode 2, and 7 is a contact hole.

When an electrical potential is supplied to the common electrodes on the opposing substrate, a conductive material is applied to the opening section of the transfer electrode 2, and this is connected to an electrode section on the opposing substrate. Fig. 1 shows a case in which a common electrical potential on the insulating substrate 1 is supplied to the transfer electrode section through the conductive metal film 3 that has been formed in the second conductive film forming process of the insulating substrate 1. The conductive metal film 3 supplies the common electrical potential to the conductive thin film 6 through the contact hole 7 in the vicinity of the transfer electrode 2, and the conductive thin film 6 allows one portion in the opening section of the transfer electrode 2 to be directly formed on the insulating substrate 1. In the present specification, one portion refers to a range of approximately 10 % to 90 % of the opening section of the transfer electrode 2.

Moreover, as illustrated in Fig. 1, the conductive metal film 3 is placed so as to be located within the insulating films 4 and 5, whereby it is possible to avoid a problem that arises when the conductive metal film 3 is placed so as to be exposed outside from the edges of the insulating films 4 and 5. In other words, it is possible to solve the problem that at the time of hole-forming processes of the

insulating films 4 and 5, below the edge of the conductive metal film 3, the insulating film 5 is etched outward from the center of the opening section of the transfer electrode 2 in a grooved form with the result that the coverage of the conductive thin film 6 deteriorates.

The above-mentioned arrangement makes it possible to make the center portion of the transfer electrode 2 thin as compared with the peripheral portion; therefore, even in the case of an insufficient deformation under compression of the conductive material, the cell gap in the vicinity of the transfer electrode is not made thicker so that the cell gap in the vicinity of the transfer electrode 2 is uniformly maintained. Thus, it is possible to prevent local variations in the panel transmittance, to improve the uniformity in luminance, and also to improve the yield. Moreover, the gap portion of the metal film is made comparatively wider, and the insulating film is not interpolated in the gap portion; therefore, the deformation under compression of the conductive material can be confirmed easily from the rear face of the array substrate.

[EMBODIMENT 2]

Referring to Fig. 2, the following description will discuss the EMBODIMENT 2. Fig. 2 shows a cross sectional view of a transfer electrode in the EMBODIMENT 2 of the present invention, and the following description will discuss the construction together with the functions thereof. Here, the construction in which an electrical potential is connected to the common electrodes (conductive thin film) on the opposing substrate side from the transfer electrode on the insulating substrate 1 through the conductive material is the same as

that shown in Fig. 4; therefore, the description thereof is omitted. Fig. 2 shows a cross-sectional shape of the transfer electrode on an array substrate side of a liquid crystal display constituted by a pair of insulating substrates that are joined to each other with a liquid crystal layer interpolated in between; and reference number 1 is an insulating substrate (glass substrate); 2 is a transfer electrode; 4 is an insulating film that is formed after a conductive metal film that has been formed in the second conductive film forming process of the insulating substrate 1; 5 is an insulating film that is formed after a conductive metal film that has been formed in the first conductive film forming process of the insulating substrate 1; 6 is a conductive thin film formed in the last conductive film forming process of the insulating substrate 1; 7 is a contact hole; and 8 is a conductive metal film formed in the first conductive film forming process of the insulating substrate 1.

When an electrical potential is supplied to the common electrodes on the opposing substrate, a conductive material is applied to the center portion of the opening section of the transfer electrode 2, and this is connected to an electrode section on the opposing substrate. Fig. 2 shows a case in which a common electrical potential on the insulating substrate 1 is supplied to the transfer electrode section through the conductive metal film 8 that has been formed in the first conductive film forming process of the insulating substrate 1. The conductive metal film 8 supplies the common electrical potential to the conductive thin film 6 through the contact hole 7 in the vicinity of the opening section of the transfer electrode 2, and the conductive thin film 6 allows one portion of the opening section in the center portion of the transfer electrode 2 to be directly formed on the insulating substrate 1.

Moreover, Fig. 2 has exemplified the structure in which the conductive metal film 8 is placed within the insulating films 4 and 5, the conductive metal film 8 may be removed at the same positions as the insulating films 4 and 5. Moreover, in the case of the conductive metal film 8 having a shape that allows it to expose toward the center portion from the insulating films 4 and 5, it is not necessary to provide a structure having individual contact holes as shown in Fig. 2, and is allowed to contact the conductive thin film 6 by removing the insulating films 4 and 5 on the exposed portion of the metal film 8 upon removing the insulating films 4 and 5 at the center portion of the opening section of the transfer electrode 2, thereby making it possible to supply the common electrical potential.

The above-mentioned arrangement makes it possible to make the center portion of the transfer electrode 2 thin as compared with the peripheral portion; therefore, even in the case of an insufficient deformation under compression of the conductive material, the cell gap in the vicinity of the transfer electrode is not made thicker so that the cell gap in the vicinity of the transfer electrode 2 is uniformly maintained. Thus, it is possible to prevent local variations in the panel transmittance, to improve the uniformity in luminance, and also to improve the yield. Moreover, the gap portion of the metal film is made comparatively wider, and the insulating film is not interpolated in the gap portion; therefore, the deformation under compression of the conductive material can be confirmed easily from the rear face of the array substrate.

[EMBODIMENT 3]

Referring to Fig. 3, the following description will discuss the EMBODIMENT 3 of the present invention. Fig. 3 shows a cross-cross cross sectional view of a transfer electrode in the EMBODIMENT 2 of the present invention, and the following description will discuss the construction together with the functions thereof. Here, the construction in which an electrical potential is connected to the common electrodes (conductive thin film) on the opposing substrate side from the transfer electrode on the insulating substrate 1 through the conductive material is the same as that shown in Fig. 4; therefore, the description thereof is omitted. Fig. 3 shows a cross-sectional shape of the transfer electrode on an array substrate side of a liquid crystal display constituted by a pair of insulating substrates that are joined to each other with a liquid crystal layer interpolated in between; and reference number 1 is an insulating substrate (glass substrate); 2 is a transfer electrode; 3 is a conductive metal film that is formed in the second conductive film forming process of the insulating substrate 1; 4 is an insulating film of the second layer that is formed after a conductive metal film 3 that has been formed in the second conductive film forming process of the insulating substrate 1; 5 is an insulating film of the first layer that is formed after a conductive metal film 8 that has been formed in the first conductive film forming process of the insulating substrate 1; 6 is a conductive thin film formed in the last conductive film forming process of the insulating substrate 1; 7 is a contact hole; and 8 is a conductive metal film formed in the first conductive film forming process of the insulating substrate 1.

When an electrical potential is supplied to the common

electrodes on the opposing substrate, a conductive material is applied to the opening section of the transfer electrode 2, and this is connected to an electrode section on the opposing substrate. Fig. 3 shows a case in which a common electrical potential on the insulating substrate 1 is supplied to the transfer electrode section through the conductive metal film 8 that has been formed in the first conductive film forming process of the insulating substrate 1 and the conductive metal film 3 that has been formed in the second conductive film forming process of the insulating substrate 1. The metal films 3 and 8 supply the common electrical potential to the conductive thin film 6 through the contact hole 7 in the vicinity of the opening section of the transfer electrode 2, and the conductive thin film 6 allows at least one portion in the center portion of the transfer electrode 2 to be directly formed on the insulating substrate 1. Moreover, Fig. 3 has exemplified the structure in which the conductive metal film 8 is placed within the insulating films 4 and 5; however, in the same manner as the EMBODIMENT 2, the conductive metal film 8 may be removed at the same positions as the insulating films 4 and 5 on the center side of the opening of the transfer electrode. Moreover, in the case of the metal film 8 having a shape that allows it to expose toward the center portion from the insulating films 4 and 5, it is not necessary to provide a structure having independent contact holes on the conductive metal film 8 as shown in Fig. 3, and is allowed to contact the conductive thin film 6 by removing the insulating films 4 and 5 on the exposed portion of the metal film 8 upon removing the insulating films 4 and 5 at the center portion of the opening section of the transfer electrode 2, thereby making it possible to supply the common electrical potential.

The above-mentioned arrangement makes it possible to make the center portion of the transfer electrode 2 thin as compared with the peripheral portion; therefore, even in the case of an insufficient deformation under compression of the conductive material, the cell gap in the vicinity of the transfer electrode is not made thicker so that the cell gap in the vicinity of the transfer electrode 2 is uniformly maintained. Thus, it is possible to prevent local variations in the panel transmittance, to improve the uniformity in luminance, and also to improve the yield. Moreover, the gap portion of the metal film is made comparatively wider, and the insulating film is not interpolated in the gap portion; therefore, the deformation under compression of the conductive material can be confirmed easily from the rear face of the array substrate.

Referring to EMBODIMENT 1 to EMBODIMENT 3, the present invention has been explained; however, the present invention is not intended to be limited by EMBODIMENT 1 to EMBODIMENT 3, and various modifications may of course be made within the scope of the present invention.

For example, not limited to the layer construction of the conductive metal films and the insulating films formed on the array substrate of EMBODIMENT 1 to EMBODIMENT 3, the present invention may be applied to the case in which the conductive thin film to be connected to the conductive material forming the transfer electrode is directly formed on the array substrate.

In the liquid crystal display of the present invention, since at least one portion of the central portion of the transfer electrode is directly formed on the first insulating substrate, it is possible to narrow

the center portion of the transfer electrode as compared with the peripheral portion; therefore, even in the case of an insufficient deformation under compression of the conductive material, the cell gap in the vicinity of the transfer electrode is not made thicker so that the cell gap in the vicinity of the transfer electrode is uniformly maintained. Thus, it becomes possible to prevent local variations in the panel transmittance, to improve the uniformity in luminance, and also to improve the yield. Moreover, the gap portion of the metal film is made comparatively wider, and the insulating film is not interpolated in the gap portion; therefore, the deformation under compression of the conductive material can be confirmed easily from the rear face of the array substrate.

[BRIEF EXPLANATION OF THE DRAWINGS]

[Fig. 1] A cross sectional view showing a transfer electrode of EMBODIMENT 1 of the present invention;

[Fig. 2] A cross sectional view showing a transfer electrode of EMBODIMENT 2 of the present invention;

[Fig. 3] A cross sectional view showing a transfer electrode of EMBODIMENT 3 of the present invention; and

[Fig. 4] A cross sectional view showing a conventional transfer electrode.

[Explanation of Reference Numerals]

1 insulating substrate

2 transfer electrode

3, 8 conductive metal film

4, 5 insulating film

6 conductive thin film

7 contact hole

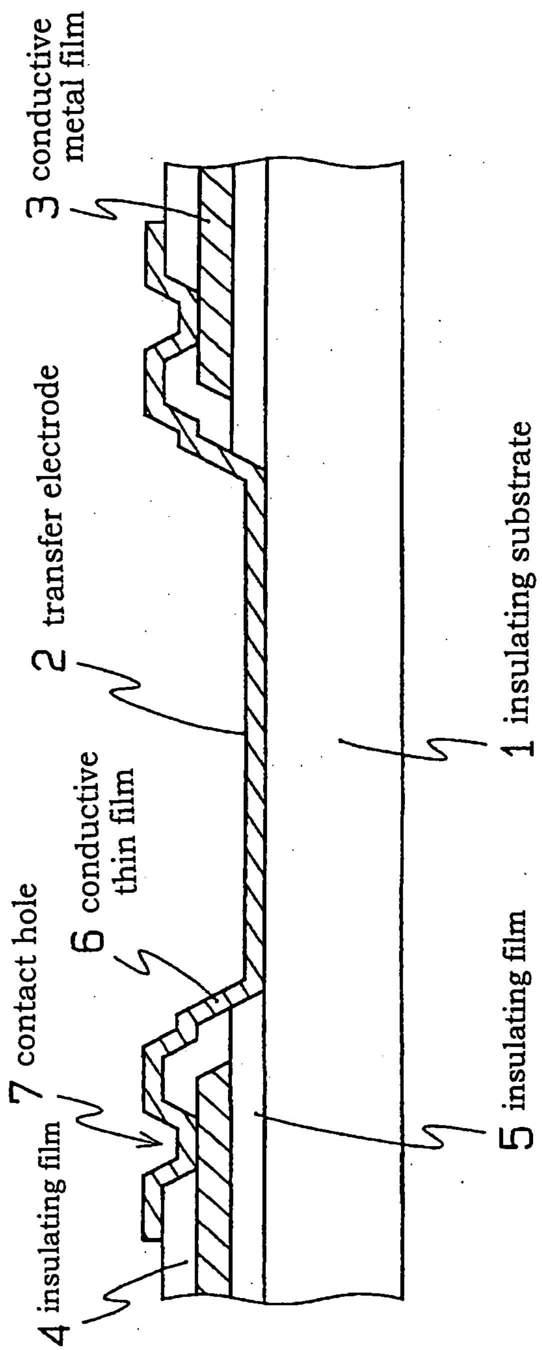
9 conductive material

10 counter substrate

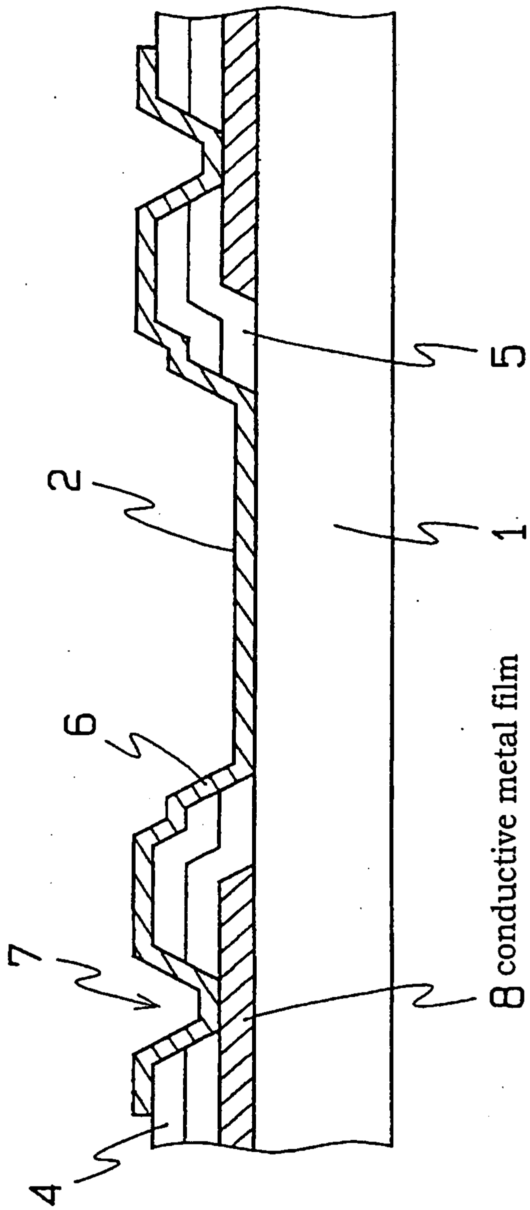
11 conductive thin film

[Document Name] DRAWINGS

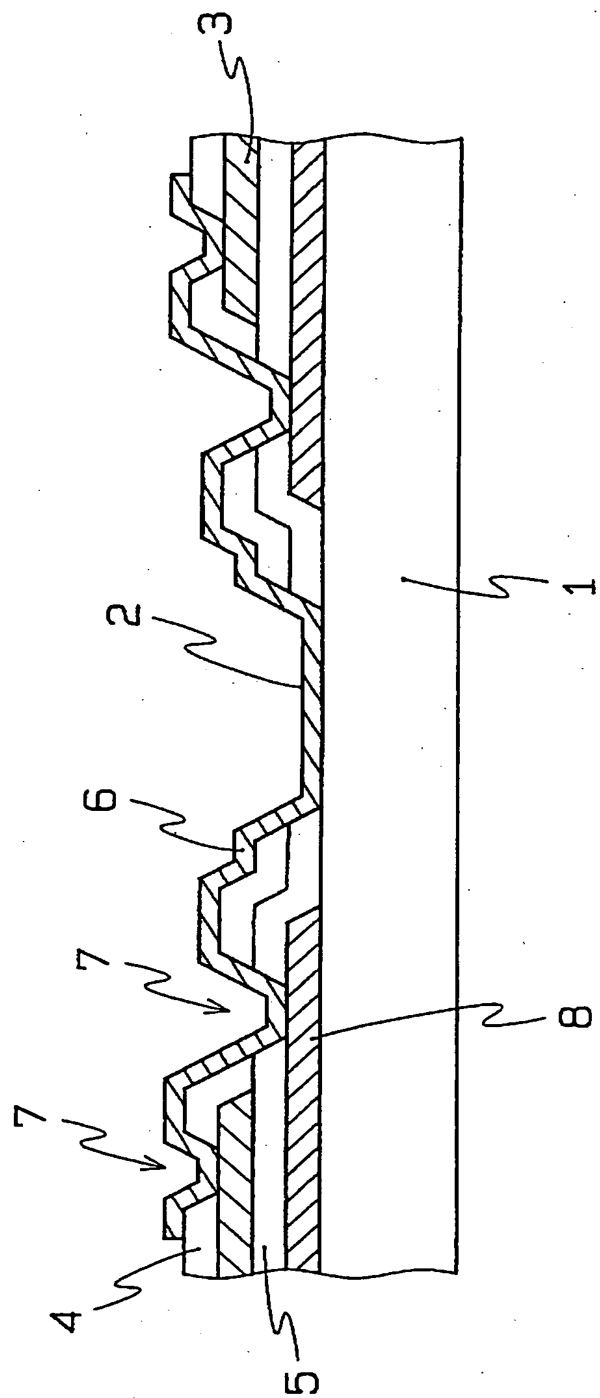
[Fig. 1]



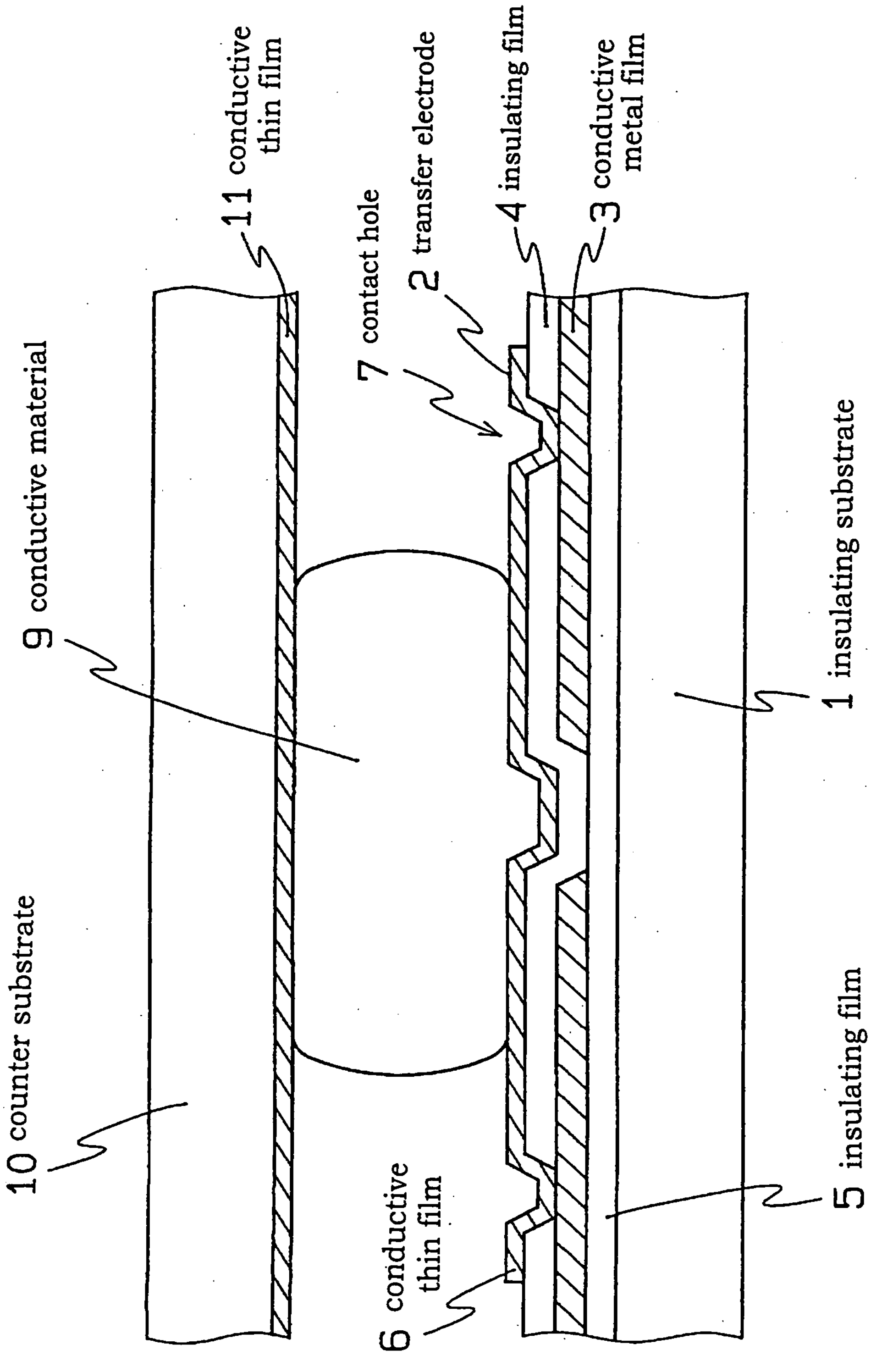
[Fig. 2]



[Fig. 3]



[Fig. 4]


11 conductive thin film
2 transfer electrode
4 insulating film
3 conductive metal film
7 contact hole
9 conductive material
1 insulating substrate
10 counter substrate
5 insulating film
6 conductive thin film

[Document Name] ABSTRACT

[Abstract]

[Problem] The object of the present invention is to make the cell gap uniform, improve the yield, and easily confirm deformation under compression of the conductive material from the rear side of the array substrate.

[Solution] By the transfer electrode for supplying a common electrical potential to common electrodes of the counter insulating substrate, wherein the transfer electrode is provided on an insulating substrate 1, wherein the conductive metal film 3 supplying the common electrical potential to the transfer electrode is connected to the conductive thin film 6 which has been formed by a step for forming a last metal film of the insulating substrate 1 through a contact hole 7 on a periphery of the transfer electrode, and wherein the conductive thin film is directly formed on the insulating substrate 1 at one portion of the center portion of the opening section of the transfer electrode, it is possible to narrow the center portion of transfer electrode 2 as compared with the peripheral portion, the cell gap in the vicinity of the transfer electrode is not made thicker so that the cell gap in the vicinity of the transfer electrode is uniformely maintained even in the case of an insufficient deformation under compression of the conductive material.

[Selected Figure] Fig. 1